

REMARKS

Claims 1-22 are pending in the present application. In an Office Action dated March 03, 2004, claims 1-6, 10, 12-17, and 19-21 are rejected on prior art and/or indefiniteness grounds while claims 2, 6, 8, 9, 10, 12-14, 16-21 are objected to for various informalities. Additionally, claims 7-9, 11, 18-20, and 22 are indicated as being allowable if amended to overcome the outstanding objections/rejections and if placed in independent form including all limitations of respective base and intervening claims.

In reply to the Action, Applicant herein amends claims 1, 3-6, 8-10, 12, and 14-21 and submits the present Remarks which place the application in condition for allowance. Entry and consideration hereof are respectfully requested.

Applicant now specifically addresses, in turn, the Examiner's various objections and rejections.

As mentioned, claims 2, 6, 8-10, 12-14, 16-21 are objected to in the Office Action at paragraphs 2-15 for various informalities. Herein, claims 2 and 13 are cancelled, thus the objections thereof are rendered moot. Further, claims 6, 8-10, 12, 14, and 16-21 are amended herein to address and comply with the Examiner's objections. Applicant submits that all of the outstanding objections are overcome by the present amendment. Thus, reconsideration and withdrawal of all objections is respectfully requested.

Claim 19 and 20 are rejected under 35 U.S.C. §112, first paragraph, as being indefinite for want of antecedent basis. Herein, claims 19 and 20 are amended to replace "prostheses" with --one or more artificial limbs--, as suggested by the Examiner. Thus, claims 19 and 20 now comply with all provisions of §112, especially those relating to indefiniteness; reconsideration and withdrawal of the outstanding §112 rejections are respectfully requested.

Independent claims 1 and 12 are both rejected under 35 U.S.C. §102(b) as allegedly lacking novelty in view of each of the following references: (1) European Patent No.

421780 to Hudgins; (2) U.S. Patent No. 4,030,141 to Graupe; and (3) U.S. Patent No. 5,212,476 to Maloney.

In response to these rejections, claims 1 and 12 are amended herein to include all of the limitations of claims 2 and 13, respectively, and to include additional limitations. Notably, claims 1 and 12 now recite a plurality of sets of electrodes for receiving EMG signals and being dedicated to the source of EMG signals, where the sets of electrodes are placed or are configured to be placed subcutaneously, epimesially or intramuscularly. As will be shown herein, neither the Hudgins, Graupe, nor Maloney references individually teach at least these emphasized limitations of amended claims 1 and 12. Thus, the outstanding novelty rejections are improper and may not be maintained.

Turning first to Hudgins, the reference relates to a system of controlling a prosthetic limb based upon myoelectric signal patterns associated with the onset of muscle contraction. Hudgins specifically uses standard surface electrodes to detect the myoelectric signal. Col. 2, lines 11-15. The reference does not teach or even suggest implanted electrodes such as electrodes placed subcutaneously, epimesially, or intramuscularly, as recited in claims 1 and 12. Further, Hudgins intends to increase the amount and quality of information used to determine limb function from *a single myoelectric channel*. Col. 3, lines 8-15. The reference aims to increase the number of functions of an artificial limb which can be controlled by *a single myoelectric channel*. *Id.* Hudgins does not teach a plurality of sets of electrodes dedicated to an EMG signal source for receipt of EMG signals, as recited in claims 1 and 12. Furthermore, Hudgins explicitly teaches away from this limitation by attempting to maximize control of an artificial limb by way of a single myoelectric channel.

Accordingly, Hudgins fails to disclose all of the limitations of claims 1 and 12, therefore the §102 anticipation rejection of claims 1 and 12 is improper and may not be maintained; reconsideration and withdrawal thereof is respectfully requested.

As mentioned above, claims 1 and 12 are further rejected as lacking novelty in view of Graupe. However, as will now be shown, this reference also fails to disclose every limitation of the rejected claims, thus the novelty rejection is improper.

Graupe teaches a an EMG-based method of actuating a prosthetic appliance wherein only a single pair of electrodes is used to actuate several artificial limb movements. Abstract, lines 1-5. By using only a single set of electrodes, the reference allegedly overcomes deficiencies of prior arrangements which used a plurality of electrode sets. Graupe describes these prior arrangements as encountering problems due to physical overcrowding of electrodes (col. 3, lines 13-40), unwanted interactions between the plurality of electrodes (col. 3, lines 41-51), and due to difficulties in maintaining proper contact of the electrodes with the limb (col. 3, lines 52-60). The reference addresses these problems associated with numerous EMG electrodes by providing a system of “the fewest possible number of electrodes” while maximizing the use of information in the EMG signal. Col. 4, lines 12-20.

As discussed above, claims 1 and 12 of the present application are amended to recite a plurality of sets of electrodes. Clearly, this limitation is not met by Graupe. In fact, Graupe *expressly teaches away* from multiple sets of electrodes.

Furthermore, Graupe utilizes *surface electrodes* in the described EMG method. That is, Graupe expressly states that “the preferred electrode is the so-called “surface electrode” which is glued to the skin or held in contact therewith by a bandage.” Col. 3, lines 57-60. This disclosure is supported in the claims where a set of electrodes is recited as being adapted to receive EMG signals from a stump of a missing limb *when fastened thereto*. Col. 19, lines 34-40.

The Examiner states at item no. 20 in the Office Action that “the sets of electrodes [of Graupe] are preferably “surface electrodes” but can alternatively be subcutaneously placed needle electrodes or internal electrodes planted in a muscle.” Applicant respectfully submits that this is a mis-reading of the Graupe reference. Graupe mentions the possibility

of using a needle electrode (col. 6, lines 50-60) but in the Background section describes that this type of electrode is disadvantageous because it “necessitates the skin being punctured and repunctured periodically...” (col. 3, lines 60-65). Thus, to overcome these disadvantages Graupe employs *surface electrodes*. Moreover, it is noted with emphasis that a needle electrode, as it is known in the art, protrudes from the skin to be exposed externally and is thus not placed subcutaneously, epimesially, or intramuscularly, as recited in claims 1 and 12.

Additionally, claims 1 and 12 recite that the plurality of sets of electrodes are dedicated to a source of EMG signals. Graupe does not disclose this limitation but instead teaches a single set of electrodes “capable of controlling as many as six different functions from a single set of surface electrodes”. Col. 6, lines 11-14. Thus, the single set of electrodes of Graupe necessarily receives EMG signals from multiple sources , e.g., multiple muscles, or multiple compartments within a muscle, etc. Accordingly, the surface electrodes of Graupe are not dedicated to a source of EMG signals, as claimed by Applicant.

In sum, Graupe fails to teach a plurality of subcutaneously, epimesially, or intramuscularly placed electrodes dedicated to an EMG signal source, as recited in amended claims 1 and 12. Thus, the outstanding novelty rejection is improper and must be withdrawn.

Claims 1 and 12 are further rejected under 35 U.S.C. §102(b) as lacking novelty with respect to U.S. Patent No. 5,212,476 to Maloney. Here again, however, Applicant respectfully contends that Maloney fails to disclose all of the elements of amended claims 1 and 12 and, thus, the rejection is improper and may not be maintained.

Maloney teaches an intraoral controller for receiving and transmitting EMG signals. The controller is a dental appliance or splint which is disposed in the mouth in contact with the mandible. Col. 3, lines 30-39. The controller includes four electrodes mounted thereon adjacent to the tongue. *Id.* The electrodes receive and detect EMG

signals emitted by movements of the tongue. *Id.* The controller includes a radio frequency transceiver which transmits the EMG signals to a device to be controlled, such as a means for electrically stimulating the muscles of the upper extremities, a robotic arm, or a personal computer. Col. 3, lines 40-51. The four EMG electrodes are arranged in a diamond pattern on the tongue side of the controller. Col. 3, lines 52-54.

The Maloney controller is best shown in Figures 1-3 of the reference wherein the controller 10 includes a substrate 12 having a surface 14 adjacent to the tongue. Col. 4, lines 56-68. The four electrodes 18, 20, 22, and 24 are mounted on the surface 14 of the substrate 12. *Id.* The electrodes 18, 20, 22, and 24 detect and receive EMG signals generated by tongue movement. Col. 6, lines 21-39 and lines 47-52. Four electrotactile electrodes 70, 72, 74, and 76 are connected to a convex side 16 of the substrate 12. Col. 5, lines 59-64. The electrotactile electrodes 70-76 do not sense EMG signals, but instead provide feedback information for each of the four active EMG sensing electrodes 18-24. Col. 6, lines 4-6.

Amended claims 1 and 12 both require EMG signals received by a plurality of sets of electrodes dedicated to a source of EMG signals where the sets of dedicated electrodes are placed subcutaneously, epimesially or intramuscularly. Maloney does not teach a plurality of sets of electrodes, as claimed. Instead, as discussed above, the reference teaches only one set of four EMG sensing electrodes. Additionally, Maloney does not disclose a plurality of sets of subcutaneously, epimesially or intramuscularly placed electrodes, as also claimed. To the contrary, the reference teaches mounting surface electrodes to an intraoral substrate. In the Background section, Maloney acknowledges that EMG signals may be detected by needle electrodes. However, as discussed above, such needle electrodes are known in the art to protrude from the skin to be exposed externally and thus are not placed subcutaneously, epimesially, or intramuscularly, as recited in claims 1 and 12.

Accordingly, Maloney at least fails to disclose a plurality of sets of subcutaneously, epimesially, or intramuscularly placed electrodes for receiving EMG signals, as recited by

claims 1 and 12. Thus, the outstanding novelty rejection is improper and must be withdrawn.

For at least the reasons set forth above, the Hudgins, Graupe, and Maloney references, taken singularly, do not teach all of the limitations of independent claims 1 and 12; reconsideration and withdrawal of all relevant outstanding novelty rejects is respectfully requested. Claims 1 and 12 are not further rejected or objected to and are thus allowable to Applicant.

Claims 2-6, 10, 13-17, and 21 are rejected as lacking novelty under 35 U.S.C. §102(b) with respect to one of the Hudgins, Graupe, and Maloney references. However, all of these claims depend, ultimately, upon allowable claim 1 or 12. Thus, claims 2-6, 10, 13-17, and 21 are correspondingly allowable; reconsideration and withdrawal of all relevant outstanding novelty rejects is respectfully requested.

Finally, Applicant notes that an additional minor amendment is made herein to claims 1, 5, 6, 8, and 9 to clarify the invention. In these claims “prostheses” has been replaced with “one or more prosthesis components”. No new matter is introduced by this amendment as support can be found at least at page 8, lines 7-8 of the originally filed application. Further, it is noted that none of the amendments discussed herein present new matter as antecedent support is found throughout the originally filed application.

As discussed, all outstanding rejections and objections are herein overcome. Claims 1, 3-12, and 14-22 are now allowable to Applicant. Applicant thus respectfully requests withdrawal of all rejections and objections and prompt issuance of a Notice of Allowance.

The Examiner is invited to contact Applicant’s attorneys at the below-indicated telephone number regarding this Reply or otherwise concerning the present application.

Applicant hereby petitions for any necessary extension of time required for consideration and entry of the present Reply.

Please charge any required fees for this Reply, or otherwise concerning the present application, to Deposit Account No. 06-1130 maintained by Applicant's attorney.

Respectfully submitted,

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